

Statistical Physics B

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Mateusz Homenda, room 5.26

mateusz.homenda@fuw.edu.pl

1. **Exercise 1:** Density of states. Calculate the density of states $g(E)$ of one particle in a cubic box. *Additionally obtain the expression for 2-dimensional and 1-dimensional systems.*
2. **Exercise 2:** (Appendix D and E) Study the properties of Bose-Einstein and Fermi-Dirac functions. Derive the expansion for $z < 1$.

$$G_\nu(z) = \int_0^\infty dx \frac{x^{\nu-1}}{z^{-1}e^x - 1} \quad z \leq 1 \quad \Gamma(\nu) \sum_{n=1}^\infty \frac{z^n}{n^\nu}$$

$$F_\nu(z) = \int_0^\infty dx \frac{x^{\nu-1}}{z^{-1}e^x + 1} \quad z \leq 1 \quad \sum_{n=1}^\infty \frac{(-1)^{n-1} z^n}{n^\nu}$$